

$\mathcal{H}_1 = \{ \mathbf{h}_1, \mathbf{h}_2, \dots, \mathbf{h}_M \}$ and $\mathcal{H}_2 = \{ \mathbf{h}_{M+1}, \mathbf{h}_{M+2}, \dots, \mathbf{h}_{M+N} \}$ are the two sets of hypotheses. The test statistic is the likelihood ratio $L(\mathbf{y}) = \frac{p(\mathbf{y} | \mathcal{H}_1)}{p(\mathbf{y} | \mathcal{H}_2)}$. The decision rule is to choose \mathcal{H}_1 if $L(\mathbf{y}) \geq \tau$ and \mathcal{H}_2 otherwise, where τ is the threshold. The probability of detection P_D and the probability of false alarm P_{FA} are defined as $P_D = P(\text{choose } \mathcal{H}_1 | \mathcal{H}_1 \text{ is true})$ and $P_{FA} = P(\text{choose } \mathcal{H}_1 | \mathcal{H}_2 \text{ is true})$. The receiver operating characteristic (ROC) curve is the plot of P_D versus P_{FA} . The area under the ROC curve (AUC) is a measure of the performance of the detector. The AUC is 0.5 for a random detector and 1.0 for a perfect detector. The AUC is a measure of the probability of correct detection P_C . The AUC is a measure of the probability of correct detection P_C .

10